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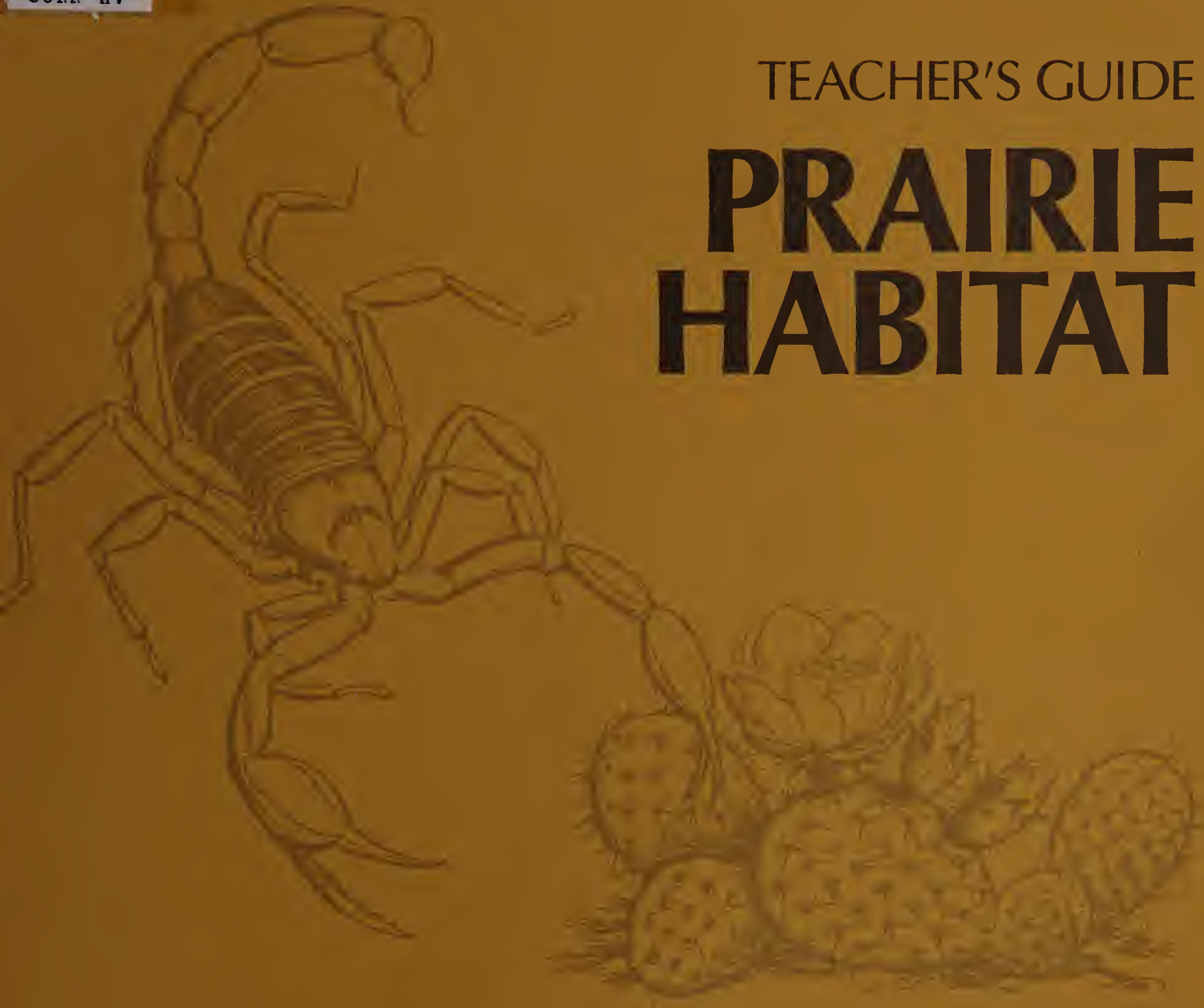
Unit No. 10

TEACHER'S GUIDE

PRAIRIE HABITAT



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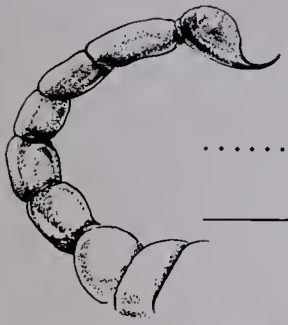
PRAIRIE HABITAT — Plant and Animal Parts



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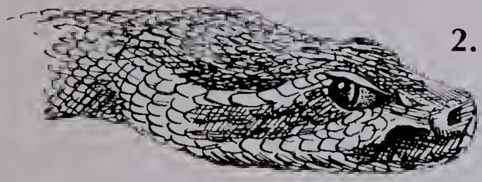

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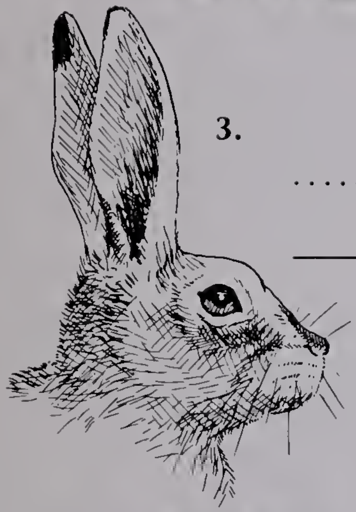

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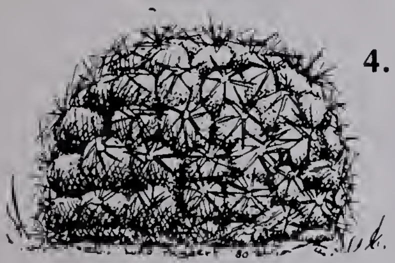

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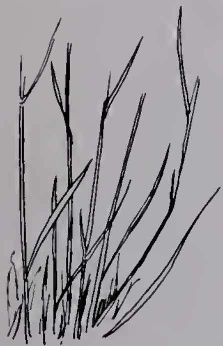

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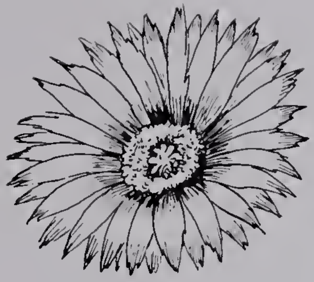

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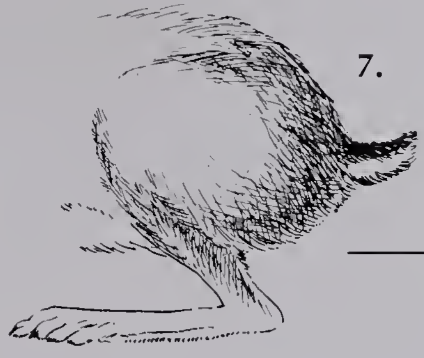

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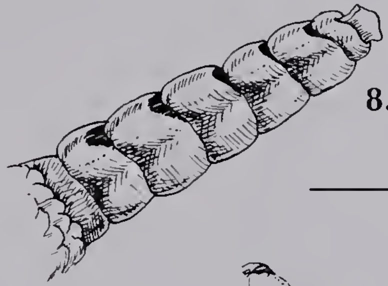

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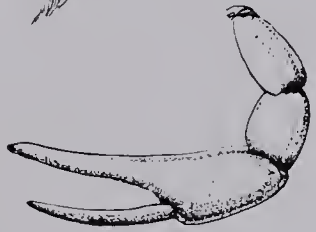

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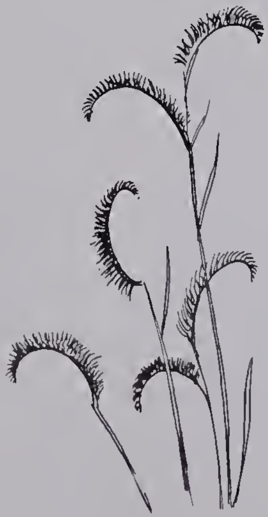

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ACKNOWLEDGEMENTS

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Background Information

Climate, terrain and geologic history affect the types of plants and animals that live in Alberta. In the southeastern part of Alberta, the yearly precipitation is about 35 cm, and 20 cm or less during the growing season. This small amount of water creates a desert-like condition. There is usually a wind, and the soils are shallow and poor in quality. Grasses grow where there is enough rainfall — but not enough to produce trees and forests. Alberta's grasslands are part of the Great Plains which stretch from the Gulf of Mexico to the southern parts of the Canadian prairie provinces.

All grasslands of the world have many things in common. Droughts are frequent, temperatures are extreme, and strong winds sweep across them almost continuously. The plant cover and animal life is remarkably uniform over large areas in the grasslands. In North America, it took a long series of changes to bring the grasslands into being.

About 60 million years ago, the newly formed Rocky Mountains aided in establishing a continental climate in central North America. Then, about 36 million years ago, the central area of North America grew colder and drier. The forests were forced out, and sod-forming grasses and flowering plants evolved. At the same time, grass-eating mammals adapted themselves to this semi-arid environment that lacked trees. With the passage of time, the Rocky Mountains rose higher, and some 25 million years ago the climate became even cooler and drier. Grasses were the dominant vegetation at this time, and eventually a sea of grass stretched from Mexico to Canada in central North America.

During the ice ages of the Pleistocene epoch, the grassy areas were pushed southward. The last ice age began to disappear about 12,000 years ago. Since then, there have been periods that were warmer than today. These warm periods are called "altithermal" periods, and they have made a major impact on Alberta's present plant and animal life. The Peace River prairie is a relict of an altithermal time, and interestingly, both cactus and sagebrush still exist there.

In Alberta, there are about 12 million hectares of grasslands, and almost 5 million hectares of shortgrass prairie. Much of this region is now either ranchland or under cultivation. There are no trees except in the river valleys and coulees, and on ranches where they're planted as windbreaks. The prairies have produced huge grain crops that contribute to the world food supplies. The shortgrass prairie provides a habitat for sagebrush, buckbrush, cacti, grasses, pronghorns, and rattlesnakes. Many shallow, alkaline lakes are also found here.

Before European settlement, huge fires raged uncontrolled across the prairies and on into the woodlands, thus extending the grasslands. Some of the fires were started by lightning or other natural causes, but many were deliberately set by the Indians for several reasons, but mainly to burn off old, dry grass in order to encourage new green shoots to grow. These new green shoots attracted animals like the Bison or Buffalo, that the Indians hunted, thus plentiful meat and hides were ensured. As the animals roamed freely, the Indians moved camp to be near them, and there was little danger of the overgrazing that exists with the cattle herds of today. Since management of prairies by fire is not possible today, the prairies are becoming smaller as the woodlands and cities expand and gradually move in on them.

Before European settlement and agriculture entered the prairies, plants and animals had more or less reached an equilibrium, or as it is more commonly known, a balance of nature. What few changes there were occurred slowly because of gradual climate changes, not because any one animal or plant became more dominant. Today, less than a century later, every prairie community of plants and animals has felt the impact of settlement and agriculture. Vegetation has been subjected to ploughs and irrigation, and wildlife subjected to cattle, fences, and ruthless hunting. The Bison, for example, have almost been wiped out.

The future of the Prairie Grasslands is in doubt as human populations expand, and the need for new land to grow crops increases. It is only the vastness of its size and the amazingly diversified plant and animal life that have ensured its survival to date. Consideration must be given to the preservation of this area, not only for human enjoyment today and tomorrow, but also for the retention of the native plants and animals that live there.

USE OF THIS KIT

Unit #10 is an extension of the "Flora and Fauna of Alberta" learning resources kit, and was designed and developed to meet the objectives of the upper elementary and grade seven science curricula. Unit #10 also provides opportunities for integration with Language Arts and Social Studies.

General Objectives

As a result of studying this unit, the pupil should be able to:

1) demonstrate knowledge about plant and animal life in the prairie habitat.
2) understand the grasslands and shortgrass prairie as habitats.
3) think critically about environmental issues in relation to the prairies and grasslands.
4) understand the relationship between preservation and conservation of the prairie animals, plants and habitats in regard to man's increasing agricultural needs.

Specific Objectives

1) identify some of the common plants and animals of the prairie habitat.
2) describe specialized features of prairie plants and animals.
3) explain predator/prey relationships of prairie animals.
4) describe the prairie habitat of several plants and animals.
5) describe the climate and the effects of climate on the prairie habitat.
6) describe the special adaptations of prairie plants and animals to drought.
7) describe the characteristic features of the prairie habitat.
8) describe a number of environmental concerns threatening the existence of the prairies.

9) recommend action that can be taken to preserve and conserve the prairie habitat.

Plants and Animals Discussed in this Unit

Plants

1. Blazing Star *(Liatris punctata)*
2. Buffalo Berry, Thorny *(Shepherdia argentea)*
3. Butte Primrose (Rock Rose) *(Oenothera caespitosa)*
4. Cactus, Cushion or Ball *(Mamillaria vivipara)*
5. Cactus, Prickly Pear *(Opuntia polyacantha)*
6. Choke Cherry *(Prunus virginiana* var. *melanocarpa)*
7. Crocus, Prairie (Prairie Anemone) *(Anemone patens* var. *wolfgangiana)*
8. Golden Bean *(Thermopsis rhombifolia)*
9. Grass, Blue Grama *(Bouteloua gracilis)*
10. Lupine, Wild *(Lupinus argenteus)*
11. Phlox, Blue *(Phlox alyssifolia)*
12. Sagebrush *(Artemisia tridentata)*
13. Sage, Pasture *(Artemisia frigida)*
14. Thistle, Bull *(Cirsium vulgare)*

Animals

1. Antelope, American Pronghorn *(Antilocapra americana)*
2. Badger *(Taxidea taxus)*
3. Beetle, Darkling (Tenebrionid) *(Eleodes* species)
4. Beetle, Long-horned (Cerambycid) *(Monilema* species)
5. Bison (American Buffalo) *(Bison bison)*
6. Bullsnake (Gopher Snake) *(Pituophis melanoleucus sayi)*
7. Bunting, Lark *(Calamospiza melanocorys)*
8. Butterfly, Swallowtail *(Papilio glaucus)*
9. Coot, American (Mudhen) *(Fulica americana)*
10. Coyote *(Canis latrans)*
11. Domestic Cattle *(Bos taurus)*
12. Deer, Mule *(Odocoileus hemionus)*
13. Eagle, Golden *(Aquila chrysaetos)*
14. Falcon, Prairie *(Falco mexicanus)*
15. Fox, Red *(Vulpes vulpes)*
16. Frog, Wood *(Rana sylvatica)*
17. Goose, Canada *(Branta canadensis)*
18. Grasshoppers (Locustidae, two species)
19. Grouse, Sage *(Centrocercus urophasianus)*
20. Hare, White-tailed Prairie (Jack Rabbit) *(Lepus townsendi)*
21. Hawk, Ferruginous *(Buteo regalis)*
22. Hawk, Sparrow (American Kestrel) *(Falco sparverius)*
23. Hawk, Swainson's *(Buteo swainsoni)*
24. Horned Lark *(Eremophila alpestris)*
25. Lizard, Short-horned *(Phrynosoma douglassi brevirostre)*
26. Meadowlark, Western *(Sturnella neglecta)*
27. Owl, Burrowing *(Speotyto cunicularia)*
28. Prairie Dog, Black-tailed *(Cynomys ludovicianus)*
29. Rabbit, Cottontail *(Sylvilagus nuttalli)*
30. Rattlesnake, Prairie *(Crotalus viridus viridus)*
31. Robberfly (Asilidae, species)
32. Salamander, Tiger *(Ambystoma tigrinum)*
33. Sandpiper, Upland *(Bartramia longicauda)*
34. Scorpion *(Vejovis boreus)*
35. Spider, Black Widow *(Latrodectus hesperus)*
36. Spider, Crab *(Ebo* new species)
37. Squirrel, Richardson's Ground *(Citellus richardsoni)*
38. Vole, Red-backed *(Clethrionomys gapperi)*
39. Weasel, Long-tailed *(Mustela frenata)*

To the Teacher

It is suggested that the one hundred and forty (140) carefully sequenced slides in this unit be used as follows:

Lesson I —**Presenting the Slides**

A. **Introduction:**

Before viewing, stimulate thinking about the prairie habitat by asking such questions as:

1. What is the first thing that comes to mind when someone says "prairies" to you?
2. Have you ever been to the prairies? What do they look like?
3. Do you know where the prairies are in North America?
4. Do you know where the prairies are in Canada? In Alberta?
5. What kinds of animals do you think live there, and what special adaptations do they have?
6. What kinds of plants do you think live there, and what special adaptations do they have?
7. Do you think the plants and animals that live on the prairies are different from those living in other parts of Alberta?
8. How do the plants and animals cope with the prairie heat and drought in summer?
9. How do you think the plants and animals cope with the prairie winters?
10. How did the Bison or American Buffalo almost become extinct?

B. **Vocabulary** (See p. 6)

Introduce the new terms in the context of the presentation.

C. present slides 1-47, as you read the script.

Lesson II —

A. Review Lesson I briefly.

B. Ask pupils if there are any questions that have occurred to them regarding the prairies. If there are any questions that cannot be answered easily, suggest that these become topics for research by one or more pupils.

If there are no questions, stimulate thinking about the prairie habitat by asking such questions as:

1) Have you ever seen a rattlesnake? How big do you think these snakes become?

   2) What do rattlesnakes feed upon? Are rattlesnakes beneficial to man?
   3) What other snakes live in the prairies?
   4) How do you think a rabbit could hide on the open prairies?
   5) Would tough plants like cacti ever be eaten by any animals?
   6) Where do you think you would find Black Widow Spiders on the prairies? What would they eat?
   7) How many wild animals do you think are killed on roads each year by cars and trucks?

C. Present slides 48-91, as you read the script.

Lesson III —

A. Review Lessons I and II briefly, and answer any short questions that may have come up by this time.

B. If there are no questions, stimulate thinking about the prairie habitat by asking such questions as:
   1) Do you think that there are any Scorpions in Alberta? How big do you think they are? How poisonous are they?
   2) Where in the prairie area do you think you would find trees?
   3) What kinds of prey do you think hawks catch in the prairies?
   4) What do you think causes the white color around the edges of so many prairie ponds?
   5) Where do you think rattlesnakes go for the winter?
   6) What animal has replaced the Bison on the prairies?

C. Present slides 92-140, as you read the script.

Lesson IV —

A. Review Lessons I, II, and III briefly, and answer any short questions that may have come up by this time.

B. **Discussion Questions**

1. How do you think artificial barriers like fences, irrigation ditches, and roads affect wild animals? (Include mammals, birds, reptiles, amphibians and insects in the discussion).
2. For survival of a species, or a group of species (community), habitat preservation is essential. How would you go about establishing an area to be preserved? Consider in the discussion such things as shelter, plant cover, water, food; present and recent disturbances to the area; proximity to a large city, airport, or large factory; present diversity of the flora and fauna on the site, and flora and fauna presently missing from the area because of man.
3. What plants and animals that you know about in the prairies are endangered or threatened with extinction? (Refer to the slides.) How did this happen, and what steps would you take to ensure that they won't become extinct? (e.g., Bison, Peregrine Falcon)
4. Man has removed many of the important predators of large herbivores such as deer. Is the present system of a controlled hunting season adequate to replace the natural predators? If not, what would you suggest as an alternative?
5. Rattlesnakes have a very important role to play in the "balance of nature". What would happen if they were killed off? Would other predators be able to "fill the gap"? What other animals might become overabundant if predators like snakes were eliminated?
6. Discuss what effect wetter summers (more rain) would have on the prairies over a long period of time. Why don't trees and bushes grow there now, except in the coulees and river valleys? What would happen to prairie grasses if there was significantly less rainfall than now on the prairies?
7. Discuss what effect a deep winter snow would have on animals like Pronghorn, Bison and deer. Discuss what effect a winter with almost no snow would have on the prairie the following spring.
8. Discuss the importance of coulees and river valleys to the prairie animals. For example, where would snakes find wintering dens? Do you think it would be a good idea to fill in coulees with earth or dirt in order to make more flat farmland? Discuss.
9. Why do you think the early European settlers favored the prairies for farming and ranching? Discuss, mentioning such things as not having to clear land; good grazing for cattle. Mention some of the problems, such as no wood to build homes, barns, corrals; little or no water, except from a well.

C. Select follow-up research, activities and exercises.

Suggested Topics

1. Classify the animals in this unit according to their way of overwintering:

Overwintering

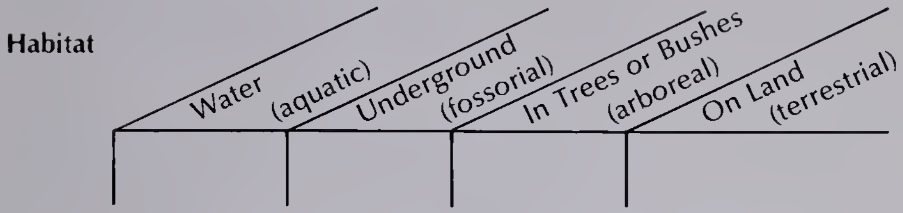
Migrators	Hibernators	Non-Hibernators

2. Classify the animals on the basis of the kind of food they eat:

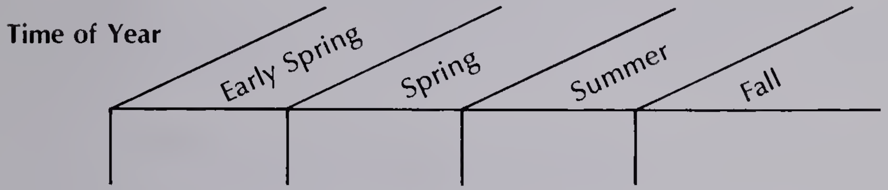
Food

Meat Eaters (Carnivores)	Plant Eaters (Herbivores)	Plant and Meat Eaters (Omnivores)

3. Classify the animals in this unit on the basis of where they nest or have their home:



4. Classify the flowering plants according to their blooming period:



5. Plan a trip to the prairies, or to a large meadow or vacated field that hasn't been used or ploughed for years. The pupils should have pencil, notebook, ruler, a hand lens and a pair of binoculars if possible. It is suggested that the teacher bring a small bag of plaster of Paris, water, and a small mixing bowl to make molds of footprint impressions. Pupils are to look for the following as evidence of living things:

   a) Droppings
   Look for droppings (or scats) of rabbits, ground squirrels, deer, grouse or other large birds. Make sketches. (Check findings in Murie, **A Field Guide to Animal Tracks**)

   b) Burrow Entrances
   Compare the shape and size of burrows made by coyote, badger, ground squirrel, pocket gopher, vole, and other burrowing mammals. Do they pile the dirt in different ways? How?

   c) Bedding and/or Resting Places
   Large herbivores lie down to chew their cud. Find places where the grass, leaves or snow are depressed. Speculate on what animal made them on the basis of size, shape, droppings, hoof prints, etc.

   d) Tracks
   Look for a variety of footprints. Note the size, and distance between prints. Confirm identification by referring to Murie's book on animal tracks. Try to determine how long ago the tracks were made. Make sketches.

   e) Feeding Places
   Look for places where grasses and bushes have been eaten or browsed upon; places where an animal was killed and eaten (pieces of hair, bone, feathers, etc.). Try to determine the prey and possible predator.

   f) Nests
   Look for mouse nests under boards, pieces of plywood, or cardboard; bird nests hidden under tufts of grass or in low bushes.

   g) Tufts of Hair or Feathers
   Look for hair or feathers on fences or prickly bushes (cactus, rose, etc.). Try to determine what animal they came from.

   h) Examine Plants
   Try to determine if plants have yet flowered or seeded. Take plant samples, identify, find out something about each plant species. Press for later study.

6. What prairie animals or plants do we mention in many of our songs? ("Home on the Range", "Red River Valley", "Ghost Riders in the Sky", "Saskatchewan", and "Four Strong Winds")

7. Explain the following:
   a) predator/prey relationship in terms of the prairie habitat.
   b) role of plants as converters of the sun's energy to food for animals.
   c) the ways that plants and animals have adapted to survive the problems of heat and drought in the prairies (e.g. color, furry stemmed plants, water storage as in cacti...).
   d) why water birds have to migrate south in winter (discuss how habitat suitable in summer changes in winter; food not available because of ice, etc.).

Lesson V —

In order to make greater use of the slides, teachers are encouraged to re-group the slides for teaching specific concepts. (See Concepts Chart, p. 6). Each slide is labelled by number and abbreviated subject, and found in the appropriate numbered slot in the tray.

To study the concept **Structure and Function**, select the appropriate numbered slides according to the Concept Chart. These slides, and any others the teacher wishes to select, could make up another lesson, thus reviewing the materials from a slightly different point of view. This same approach can be extended to more than one unit, e.g. Structure and Function of mammals, birds, insects, spiders, etc. For this type of re-grouping of slides, please refer to the Teacher's Guide to **Flora and Fauna of Alberta**.

A sheet of diagrams is provided, entitled **Prairie Habitat: Plant and Animal Parts**. In order to answer the following questions, pupils would need to understand the following relationships:
1) general structure and shape of animals and plants.
2) important organs and their functions on plants and animals.

While viewing the re-grouped slides, discuss them with the class. The following questions could be done together as a class, in groups of 2 or 3, or handled as individual assignments, depending upon the age and ability levels of the pupils.

Questions related to Diagrams: Plant and Animal Parts

1. Draw a line from plant or animal on the left to the matching part on the right that is, from figs. 1-5 to figs. 6-10.

2. Identify and write the name of each plant or animal on the dotted line provided.
3. Beside each diagram on the left side, write or indicate in what manner the plant or animal obtains its food.
4. Name the parts of the plant or animal shown in figs. 1-10 on the solid line provided.

Key to Questions

1. Matching: 1-9; 2-8; 3-7; 4-6; and 5-10.
2. 1) scorpion; 2) rattlesnake; 3) rabbit; 4) cactus; 5) grass
3. 1) predator on insects; 2) predator on mice; 3) eats plants; 4) sun and soil; 5) sun and soil.
4. 1) tail and stinger of scorpion; 2) head of rattlesnake; 3) head of rabbit; 4) trunk of ball cactus; 5) blades of grass; 6) flower of cactus — cushion or ball; 7) hind leg of rabbit; 8) rattle of rattlesnake; 9) palpus (claw) of scorpion; 10) seed head of grass

See also: Study Prints: **Fauna of Alberta**
#2 Goshawk
#6 Thirteen-lined Ground Squirrel
#10 Golden Rod Spider
#11 Polyphemus Moth

Study Prints: **Flora of Alberta**
#2 Prickly Rose
#4 Common Cattail
#6 Prairie Crocus
#7 Prickly Pear Cactus
#11 Choke Cherry

Films: **Flora and Fauna of Alberta** — Prairie Films #7, #8, #9, #10 and #11 (16mm color)

Vocabulary

CAUTION: The following vocabulary provides information for the teacher and should be used with discretion according to the pupils' ages and ability levels. The terms, which are from both the Introduction and the Script, should be introduced in the context of the slides and script.

1. *Altithermal* — of or belonging to a time during which the climate is relatively warm, often part of a postglacial time.
2. *Coulee* — a steep-walled valley made by water during a glacial period.
3. *Disruptive Camouflage* — a form of breakup coloration so that the true outline of the outline of the animal cannot be seen.
4. *Droppings (scat)* — the dung or feces of animals.
5. *Exoskeleton* — the external skeleton of animals such as insects, spiders, shrimp, lobster, etc.
6. *Forage* — food for animals like Bison and deer.
7. *Forb* — a broadleafed, herbaceous plant (not grass)
8. *Frost Line* — the depth to which frost penetrates the soil.
9. *Harbinger* — a signal or symbol announcing an event like spring.
10. *Hibernaculum* — an over-wintering den.
11. *Hoodoo* — a column or pinnacle of rock resulting from the erosion action of wind and water.
12. *Marginal Habitat* — that part of an animal's or plant's habitat that is at the lower limits of acceptability.
13. *Oasis* — a small fertile area or refuge in the midst of dry or desert-like conditions; usually with water.
14. *Ovipositor* — a specialized organ for depositing eggs.
15. *Ox-bow* — a crescent-shaped former river channel.
16. *Pectines* — modified, paired appendages on the underside of scorpions that are used to detect smells.
17. *Raptor* — any of the birds of prey (hawks, owls, falcons, etc.)
18. *Sedimentary* — formed by or from sediments.
19. *Solarium* — a room for exposure to sunlight; a very warm room.
20. *Strutting Grounds (Leks)* — a site where animals annually or regularly return for courtship display.
21. *Succulent* — having fleshy and juicy tissues.
22. *Tapeworm* — a parasitic flatworm that lives in the intestines of vertebrate animals, including man.
23. *Threatened Animal (or Plant)* — an animal (or plant), which for various reasons, is in danger of becoming extinct.
24. *Wallow* — to roll to and fro, as in a mudhole.
25. *Wind Pollination* — to be pollinated by wind; pollen borne by the wind (as opposed to pollination by insects).

Key Environmental Issues

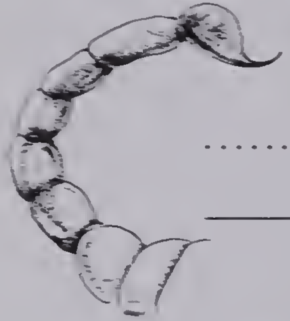
1. Because of man's continuing and increasing needs for land (cities, roads, cattle pasture, crops, recreation, etc.), very little of the prairies are left undisturbed. Man has been expanding into areas that have marginal quality of soils and plant cover. This expansion leaves very little space for the native plants and wild animals. Sometime soon, we will have to develop effective land use and land management policies and laws that will include ecological reserves..
2. Several hundred million birds and animals are killed on highways each year. Many of these animals have to cross barriers like roads and highways in order to get to egg-laying areas, calving areas, over-wintering areas, and feeding areas. The slaughter on roads has endangered many animals to the point where they are threatened with extinction. Road underpasses will have to be placed in the important travel areas. In other areas, roads may have to be relocated in order to ensure that some animals do not become extinct.

(Key words: living space, marginal land, ecological reserves, road kills, land use policy, land management policy, extinction, increasing human needs from the land, animal migration, road underpasses, road relocation).

CONCEPT CHART

CONCEPTS PLANTS & ANIMALS	Structure and Function	Food Gathering and Eating	Locomotion	Life Cycle and Development	Behavior	Protective Features	Habitat	Predator/Prey Relationship
Birds	23, 24, 26, 46, 121	20, 47, 60, 61, 99, 101, 103	21 61	25, 30, 42, 44, 90, 91, 102, 103	16, 17, 18, 19, 20, 41, 91	23, 24, 43, 60, 98	1, 2, 3, 4, 14, 15, 29, 31, 32, 46, 91, 97, 98, 100, 104	20, 21, 22, 47, 116
Mammals	39, 65, 67, 69, 114, 115, 118, 137	27, 28	10, 67, 69, 137, 138	11, 27, 53, 59, 68, 72, 89, 135	11, 27, 58, 65, 68, 72, 88, 89, 136, 138	39, 65, 66, 68, 71, 72, 88, 138	5, 6, 7, 8, 14, 15, 37, 38, 58, 70, 72, 117, 118, 139, 140	40, 53, 114, 115
Reptiles	48, 49, 50, 51, 54, 55, 56	50		49, 96, 130	48, 52, 130	36, 48, 49, 50, 54, 56	14, 15, 35, 130	50
Amphibians	55, 119, 120						14, 15, 57, 119, 120	
Insects	83, 87	83, 87	83	113, 129	112, 113, 129	83, 84, 112	14, 15, 86	85
Spiders	81, 82, 93, 94, 125, 126	80	82, 94	80, 81, 95, 125, 126	125, 126	94, 125, 126	14, 15, 80, 82, 92, 125, 126	
Grasses	9, 110, 134			9, 110, 134			14, 15, 111, 139	
Forbs and Other Plants	33, 34, 44, 62, 63, 64, 74, 75, 76, 77, 78, 106, 107, 112, 122, 123, 125, 127, 131, 133			33, 34, 62, 63, 64, 74, 77, 122, 123, 124, 125, 127, 131, 132, 133	74, 75	74, 75, 77, 124, 125	14, 15, 33, 62, 64, 105, 131, 140	79

PRAIRIE HABITAT — Plant and Animal Parts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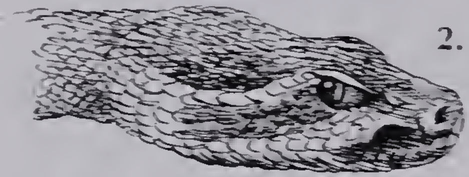
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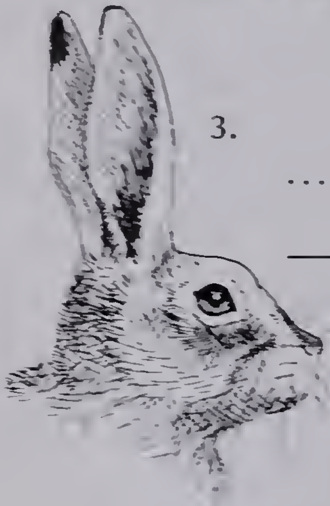
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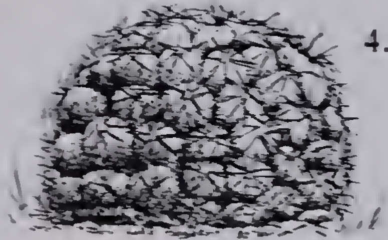
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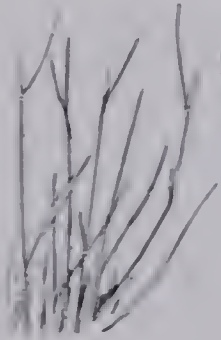
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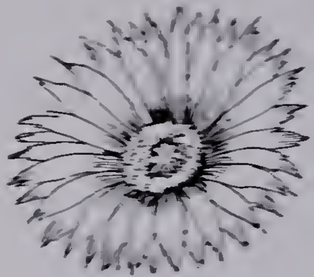
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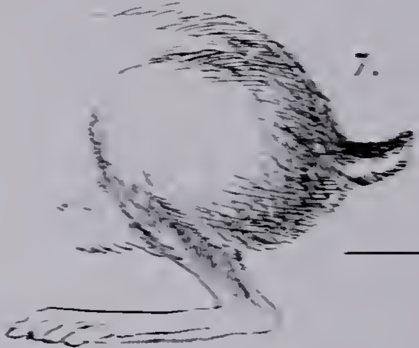
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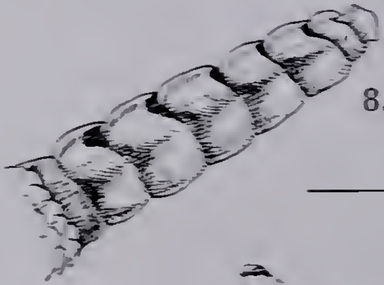
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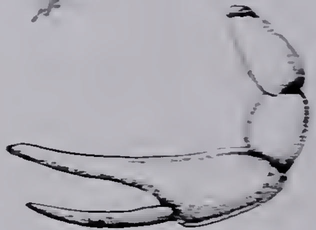
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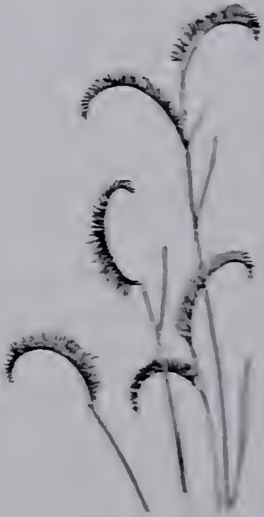
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SCRIPT

The first eight (8) slides are meant to introduce the prairie habitat. They show the general topography, river valleys, coulees, and ponds. The remaining slides illustrate the prairie over a typical year, starting with late winter and ending with late fall. Different stages of plants and animals are shown in each season.

Slide No.

1. Introductory slides.
2.
3. Title **"PRAIRIE HABITAT"**
4. The prairies are a large flat region in the central part of North America. They seem endless to some. Much of the prairies is covered by sagebrush and grasses. Without these plants there would be no prairie wildlife. Grasses and sagebrush convert the sun's energy to food for the prairie wildlife.
5. Rivers and coulees are like thin strips of greenery and life within the prairies. They are sanctuaries from the extremes of drought, heat and wind found on the prairies. Late in summer, they may be the only places on the prairies that have water, and animals tend to concentrate near them.
6. River valleys and coulees are also places where erosion takes place. Often erosion is so rapid that no plant life can become established. The softer materials, like sandstone and other sedimentary rocks, erode very quickly and deep gullies form.
7. Hoodoos are found in river valleys and coulees. They are the harder rocks that remain after wind and water erosion. They are often topped with a hard rock called a "cap rock", which protects the softer rocks underneath. The cap rocks are very distinct in this picture.
8. Natural prairie ponds are not common on most of the prairies. Usually the ground is very flat, and water does not accumulate. But, where water can accumulate, ponds form, and small bushes and lush green vegetation grow. A prairie pond is like an oasis in the desert to plants and animals.
9. Winter snows are rarely deep on the prairies, except for the drifts. But, even the little snow that does fall often buries most of the plants as few of them are taller than 30 cm. Snow on the prairies is usually windblown and densely packed.
10. Between snow storms, Jack Rabbits and Cottontails venture out and leave telltale footprints in the snow. During storms, they take shelter behind sagebrush, or they burrow into the snow. Snow burrows are called "forms", and they protect the animals from even the most severe storms.
11. Richardson's Ground Squirrels are hibernators. However, on mild days in February and March, many of them come above the ground for short periods. They will be out for only a day or two getting grass seeds and other food, then they return for a few more weeks of hibernation. Their presence is a very early signal that winter will soon be over.
12. The Horned Lark is a true harbinger of spring. These birds fly north from more southern areas and arrive long before the snow is gone. They will seek out bare patches of ground and build nests even while the ground is still frozen.
13. As spring approaches, Canada Geese arrive in pairs and in flocks. They spend much time feeding when they first arrive. They seek out grassy areas near prairie ponds to build their nests.
14. By early March, much of the winter snow has gone from the prairies. What snow does remain is usually in the form of deep drifts...
15. ...and often on protected north-facing slopes. At this time of the year, the air is crisp and cold, and the ground is still frozen.
16. At selected sites on the prairies, small piles of droppings are found, indicating that a particular bird has spent much time in one place. Can you guess what bird they are from? It would have to be a resident bird, not a migratory one. (Sage Grouse) Such piles may indicate that the ancestral strutting grounds or leks of the Sage Grouse are not far away.
17. Male Sage Grouse establish small territories which they defend and prevent other males from entering. The strutting and territorial defense start in March and continue to about mid-May. Mating occurs in mid-April.
18. Males are on their territories before daylight of each day, and remain there for an hour or so after daylight.
19. This is a male Sage Grouse in a characteristic strutting position — air sacs inflated on the neck, tail feathers upright and spread like a fan. The males fill the neck sacs with air, then make a whooping or popping sound as it is released. The strut and sounds are designed to intimidate other males, and to attract females. Sage Grouse feed heavily on sagebrush leaves, hence the name Sage Grouse.

20. The activity on the strutting grounds attracts the attention of predators like the Swainson's Hawk...

21. ...and Golden Eagle. Each of these predatory birds, or raptors, may try to catch an unwary Sage Grouse...

22. ...and occasionally they succeed. Hawks typically eat only the breast muscles of their prey. The rest of the prey is left for scavengers and other predators to eat.

23. Soon after Sage Grouse have started courtship, Horned Larks have built their nests. Notice the shape of the bill. What kinds of food do you think this bird would eat? (mainly insects) Female Horned Larks will not go directly to the nest if other animals are nearby. Note the distinct white and black markings on the bird's head, and compare with that in the next slide.

24. Note how she is almost invisible as she sits on the nest. The very distinct markings of the Horned Lark's head now blend in perfectly. This kind of camouflage is called "disruptive camouflage", and is the same kind that makes zebras invisible in grassy areas, especially on moonlit nights.

25. Horned Larks' nests are built in depressions on the ground, and are lined with grass and leaves. There are usually 2 to 4 eggs.

26. Western Meadowlarks are common on the shortgrass prairie, and their calls can be heard from dawn till dusk. Like the Horned Lark, they build their nests on the ground. Note the shape of the bill. What food does it most likely eat? (insects)

27. Richardson's Ground Squirrels are also out and active in April. They spend much of their time feeding and basking in the sun.

28. Richardson's Ground Squirrels feed heavily on new green plant growth. Having been in hibernation for about seven months, they are very hungry when they first emerge.

29. Water is scarce on the prairies, and American Coots are one of the water birds that make good use of prairie ponds. Coots can use almost any kind of food source — leaves, roots, insects, snails, and even dead fish.

30. Coots build their nests at the edges of ponds and sloughs. The nests are made of vegetation like cattails and the birds lay from 6 to 12 eggs. Very few hunters shoot Coots as they taste like fish.

31. For a short while each spring, just as the snow melts from the ground, low spots fill with water. Some are only a metre or two deep, like this slough...

32. ...or shallow and spread out over a large area like this one. In any case, they will be dry by midsummer. The lack of small bushes is an indication that there is no permanent water and, that the water may be too alkaline.

33. In late April to early May, about the time of water runoff and the beginning of ground thaw, delicate Prairie Crocuses spring up from among the dead grasses of last year. Sometimes they will even spring up from under snow. Their flowers range in colors from white to delicate blue to purple.

34. Prairie Crocuses bloom for only a very short period, depending upon the location and year. At this time of year, there are few insects flying, so most crocuses would be wind pollinated.

35. As the sun's rays warm south-facing slopes, and the warmth penetrates to depths below the frost line...

36. ...it awakens Short-horned Lizards from hibernation. Most years they emerge from hibernation early in May, but during very early springs, they appear in late April. They feed mainly on ants and other small insects.

37. Like the lizard, the Black-tailed Prairie Dog also enjoys the warmth of the prairie sun. Prairie Dogs live in colonies or "dog towns" which may contain hundreds or even thousands of Prairie Dogs. Their name is in reference to their peculiar bark-like call. The Frenchman River Valley in southern Saskatchewan is the only area in Canada where Prairie Dogs are found in a native state.

38. Prairie Dogs are about 40 cm in length and weigh up to 1.5 kg. How are Prairie Dogs suited for digging burrows? (long, sharp, claws) Compare the hind claws to the front claws. Notice the crater-like burrow in the background.

39. The food of Prairie Dogs consists mostly of leaves, stems and roots of numerous grasses and other plants. They also eat grasshoppers, beetles and bugs. Prairie Dogs do not need to drink water because they get their water from the moisture in plants.

40. An adult Prairie Dog would probably be too much for this Long-tailed Weasel to attack. However, weasels have long slim bodies, and they can easily enter the Prairie Dogs' burrows and kill and eat the young.

41. This female Canada Goose is incubating her eggs. She is also trying to make herself look invisible. Has she succeeded?

42. The nest of the Canada Goose is lined with down feathers which the female has plucked from her breast. Ordinarily, when she leaves the nest, she covers the eggs with

down. Do you know why? (It keeps them warm, and out of sight of predators.) Why didn't she cover them this time?

43. Look very carefully at the exact centre of the slide! What do you see? Look for an eye — that may give you a clue. If you guessed a female Sage Grouse, you were correct. After building the nest, it often takes a female Sage Grouse over a week to lay her 6-8 eggs. The nest is built on the ground under a sagebrush. Note her coloring. What kind of camouflage does she have?

44. Sage Grouse eggs are incubated for almost a month. When the young are first hatched, they can walk almost immediately, and can fly short distances a few days after hatching.

45. Golden Bean flowers are out at about the same time as the female Sage Grouse is hatching her eggs. This plant belongs to the pea family.

46. Burrowing Owls nest in abandoned Badger holes. They migrate north when the ground has warmed, so they are a fairly late migrant compared to a Horned Lark.

47. Burrowing Owls are predators, and like other owls, regurgitate the hard and indigestible parts of their prey in the form of pellets. Biologists can examine the pellets and tell what prey the owls have been eating. Their main food here appears to be insects, especially Grasshoppers.

48. Rattlesnakes are one of the most typical reptiles of the prairies. Prairie Rattlesnakes are either greenish, or brownish like this one. The position of the snake in this picture indicates that it is very alarmed and ready to strike. Often it will stick its tongue out. Do you know why snakes stick out their tongues? (to sense surroundings) Rattlesnakes have dry, hard, scaly skin. It is not slimy and wet.

49. The rattle on a rattlesnake's tail is made of dry skin. Each time a snake sheds its skin, one more segment is added to the rattle. Excluding the black rattle at the base of the tail, how many rattle segments can you count? (7) Note that the rattle is worn near the end. Eventually it will wear away and fall off, but new rattle segments being formed will replace it. Rattlesnakes are blind just before they shed their old skin, and when they are blind, they do not give warning before they strike. At this time, they are very dangerous.

50. Rattlesnakes have two curved fangs. The fangs are hollow so when the snake strikes, the poison is injected, much like the action of a hypodermic needle. The fangs lie flat in the mouth when it is closed.

51. Rattlesnakes hunt by day or by night. In the day, they can see their prey. In the night, they can find their prey with special heat sensitive nerves. These heat sensitive nerves are located in the round pit between the eye and the mouth. Since the pits face forward, the snake can strike its prey with deadly accuracy in total darkness. Rattlesnakes generally move slowly, except when they strike.

52. Each spring and early fall, rattlesnakes migrate. In the spring they migrate from overwintering dens to their feeding grounds, then back again in the fall. They can migrate up to 30 km or more. It is at these times that many rattlesnakes are run over on roads and killed by vehicles.

53. The main foods of rattlesnakes are young mice and ground squirrels. A rattlesnake can easily eat 4 or 5 young mice in an hour or so.

54. During summer, one of the favorite sites for snakes is a rock pile, which they use for a summer home. From these rock piles, they come out to sun themselves, or retreat from bad weather and enemies. Why would you approach a rock pile like this one with caution?

55. Another typical snake of the prairies is the Bullsnake. In some areas it is called a Gopher Snake. Whereas a rattlesnake poisons its prey, Bullsnakes squeeze them like a Boa Constrictor. Note how invisible it is. Why do you think it would be advantageous for a Bullsnake to be almost invisible? (Discuss reasons. For example, not seen by prey; not seen easily by hawks or other predatory birds.) At first glance, a Bullsnake looks very much like a rattlesnake, but...

56. ...if you look at the tail very carefully, you can see that there are no rattles. Bullsnakes move very quickly, and they have the loudest hiss of all the snakes in the world. Why do you think snakes hiss? (warning)

57. Wood Frogs are rarely found far from the shelter of river valleys and coulees in the prairie regions. For breeding, they need standing or still water as would be found in an old ox-bow or backwater. Frogs rarely, if ever, are found in prairie ponds. Why do you think this is? (because ponds are temporary)

58. Badgers are carnivores, and they usually are very solitary animals. In this case, these are young Badgers at the entrance to their burrow. Badgers can dig holes with incredible speed in search of ground squirrels, their favorite food. Badgers belong to the same family as weasels, skunks and otters.

59. Badger holes are common on the prairies wherever ground squirrels are found in numbers. Most badger

holes are ones that Badgers have dug while hunting for ground squirrels. Only a few are the actual homes of Badgers.

60. On rocky and grassy areas, an adult Horned Lark feeds its chick. Can you see the adult Horned Lark? (centre, facing camera) Can you see the chick? (facing the adult, slight right of centre) What kind of coloration does the chick have? Does the adult have the same kind? By late spring and early summer, many chicks have hatched. Some chicks, like those of the Horned Lark, are fed by the parents. But, others...

61. ...like the chicks of the Western Meadowlark, often have to catch their own food once they have left the nest.

62. By late May and early June, the flowers of the Prairie Crocus have gone, and seeds have grown. Notice the shape of the seeds. How do you think they are spread around or dispersed? What other seeds that you know of are shaped like these? (Dandelion)

63. Late May and early June also signal the arrival of the Blue Phlox flowers...

64. ...and Choke Cherry flowers. Blue Phlox and Choke Cherry are most likely to be found in protected areas like river valleys and coulees, rather than on the flat prairie.

65. What animal do you see in this picture? If you guessed a Hare or Jack Rabbit, you were correct. What do you think it is trying to do? (hide) If you were a bit further away, what would this animal resemble? (a rock) On the prairies, animals have to have many ways of hiding from predators. The example shown is a particular type of camouflage. Can you name and discuss it? (shape or form camouflage)

66. At first glance, you may not notice anything but sagebrush in this slide. But, after a very careful look, you will see a Jack Rabbit hiding in the shade of a sagebrush. Note that this time the ears are pointing upright. Why? (listening)

67. Without protective background or a low profile position, the Jack Rabbit is strikingly visible. Notice how long the hind legs are in relation to the front legs. Notice also the large eyes and ears. Hares and rabbits have extremely good vision and sense of hearing. Why would they need these abilities? (to detect predators) From what predators would they have to run or hide? (coyote, hawk, owl)

68. About the end of May, and sometimes even in June, the Pronghorn or American Antelope babies are born. They will hide for a few days by lying flat on the ground. The mother comes by every few hours to feed it milk.

69. After about 3 days, the baby Pronghorn can stand and even run faster than a man. What advantage does this give the baby Pronghorn? (ability to escape predators) By the time they are a month old...

70. ...they will be walking, running and feeding with the herd. In spring and summer, the herds are mostly made up of females and babies.

71. Notice the large white rump on the Pronghorn just to the left of centre. Compare with the rump of that of the other animal just to the right of centre. Why do you think there is a difference? (animal on the left is disturbed, perhaps by the photographer, and is flaring the white rump hairs as a danger signal)

72. Mule Deer are often found on the prairies near coulees and river valleys. Why do you think they are called "Mule" Deer? (large ears)

73. What do you see in this picture? (a baby Mule Deer) Look very carefully. Can you see its ears? Baby deer, or fawns, have no scent when they are first born. They also rely on being able to lie low, even in short vegetation, to escape detection from predators. What would be the main predator of fawns on the prairies? (coyotes)

74. By June and early July, the Cushion or Ball Cactus are blooming. At night, and during the day until about one o'clock, the Cushion Cactus flowers remain closed in order to conserve moisture. Even cactus plants, like other prairie plants, have to conserve moisture. Then, in the early afternoon...

75. ...in the heat of the day, the crimson red flowers open wide, and are visited...

76. ...by many different kinds of insects. Many prairie flowers are pollinated by insects, including ants. A whole field of Cushion Cactus flowers in bloom...

77. ...along with the bright yellow flowers of the Prickly Pear Cactus is a stunning sight to behold. Prickly Pear Cactus flowers are also closed at night, but they often open up in the late morning if the sun is out and the day is warm or hot.

78. The petals of the Prickly Cactus flowers are broad and flat, not pointed like those of the Cushion Cactus flowers.

79. Even though a cactus plant looks as if it is completely protected from all animals, there are some beetles that eat the petals and the green parts of the cactus plant. These beetles are Long-Horned Beetles. They have no wings, so they cannot fly, but they are very strong and

their exoskeletons are very hard. This beetle is about 2 cm long.

80. Black Widow Spiders, which are found throughout most of the prairies, often build their webs across the entrances to abandoned Badger holes. In the centre of this slide, you can see...

81. ...a cluster of four egg sacs and a few babies next to the egg sac. The babies are not black, but grey or cream-colored. The baby spiders will not become black until they are nearly adults.

82. The female Black Widow is shiny black, like a pair of highly polished black shoes. Sometimes these spiders have a red spot on the underside of the abdomen, but not always. This one does not have any red marking.

83. The main food source of Black Widows is flies and grasshoppers, both of which are abundant on the prairies. Notice how this grasshopper is green, like the grass it eats. What advantage does the grasshopper have by being this color? (hide from predators and parasites)

84. There is an animal in this picture. Where is it? What kind of an animal is it? (grasshopper) Why do you think it is colored this way? Where would it have to hide in order for those colors to be useful? (on sand, and with dead branches of plants) (Have one of the students point out the eyes, antennae, legs and wings.) What kind of protective coloration is this? (blending or cryptic coloration)

85. Whenever one kind of animal becomes very common, other animals develop that prey upon it and keep it from becoming too common or numerous. Grasshoppers have the ability to breed by the millions, and unless there were some checks such as other predatory insects, grasshoppers would soon plague the world. In this picture, you can see a robberfly that has caught a grasshopper. The robberfly is sucking the blood out of the grasshopper in much the same way a spider does. (Have one of the pupils point out the various parts of the robberfly and grasshopper.)

86. By midsummer, Swallowtail Butterflies have emerged. They have over-wintered as a pupa. With their long tongues, they take nectar and pollen from flowers, and where damp shorelines occur along ditches, streams or ponds, they drink water.

87. There are about 200 kinds of Swallowtail Butterflies in the world, and 5 or 6 in western Canada. Most are large and colorful, some are mostly black. Notice how the blue and red spots on the hind wings resemble eyes and a mouth. What purpose do you suppose this serves? (protection from birds, which will strike at the false head)

88. Cottontail Rabbits feed heavily on new green growth. What survival value do you think there is for a rabbit to hide its rear end and keep its eyes, nose and ears out in the open? (rear protected while able to detect approaching predators)

89. Despite their ability to run at high speed, rabbits are often blinded by car lights at night on roads and are killed. Each year in North America, several hundred million birds and mammals are killed on highways and roads by cars. That is many, many more times the number that are killed by hunters. And, if you add in all the insects, snakes, frogs, toads, turtles and other animals that are killed, the figure is truly staggering.

90. It is thought that American Coots, or Mudhens, are more numerous today than they were 20 or 30 years ago. They can breed and raise their young on water that ducks and geese cannot use. They make use of marginal or poorer habitat areas than do ducks and geese.

91. The young Coot is a very colorful bird. At this size, it is fed by its parents on plant and animal material. Coots are found in many areas other than the prairies.

92. The steep banks of river valleys and coulees, as in this slide, are also the home of Scorpions. Where do you think you would find Scorpions in this habitat? (under rocks and in crevices) Why? (hide from light; cooler; more moisture)

93. If you found a Scorpion under a stone, this is what it would look like. At the end of the tail there is a poisonous stinger. Scorpions are nocturnal animals. That is, they come out only at night. Scorpions are related to spiders, and are one of the oldest living kinds of land animals. Fossil Scorpions have been found that are over 300 million years old.

94. This Scorpion has been turned upside down in order to show some of the organs on the underside. On the venter, or underside, you can easily see the white V-shaped pectines. These are used by the Scorpion to sense odors on the ground. Do you see the pairs of white spots on the stomach? These are special breathing organs called book lungs. The stinger at the end of the tail is used for poisoning prey and for protecting the Scorpion.

95. Female Scorpions carry their babies on their backs to protect them. The babies are born alive in late July or early August. The soft, white baby Scorpions would make a nice meal for almost any predator. The babies will stay white until the yolk inside them is used up.

96. Also born in late July or early August are baby Short-horned Lizards. These lizards are very rare, and are born alive in a sac, much like a calf or kitten. Within an hour of being born, these baby lizards are able to eat ants, their main food source. This baby is about 35 mm long. Horned Lizards are found only on the hottest, driest areas of the prairies. They love the sun and heat.

97. Hoodoos are pieces of harder rock that have not been eroded away by the action of wind and water erosion. Many have peculiar shapes, and are full of holes. Do you see the roundish hole near the centre of the slide? What do you think is in the hole?

98. The holes in hoodoos are often used by birds, like this Sparrow Hawk or Kestrel, for nesting sites. Do you think predators like foxes, snakes and coyotes could get to the nest to eat the eggs or young? (No. Have pupils explain.) Which predators could get to the nest? (hawks, eagles, owls)

99. Wherever large boulders or fence posts are found on the prairies, Upland Sandpipers will be seen — often many kilometres from water. Upland Sandpipers are unusual because most sandpipers are near water. The nests of the Upland Sandpipers are made in prairie grasses, not in the reeds near shorelines.

100. Ferruginous Hawks build their nests in trees in river valleys. Much of their prey is Richardson's Ground Squirrels and other small animals. The nest is very large and is used year after year. Can you see the baby hawk left of centre, and the adult hawk in the centre?

101. These are baby Ferruginous Hawks. How old do you think they are? (a few hours) Why? (because one egg is still unhatched) Can you see the half-eaten remains of prey on the left side? What animal do you think it was? (ground squirrel)

102. Young Ferruginous Hawks grow rapidly, so the parents spend much time hunting to keep them fed, as this adult is doing. For the very young, the parents tear the prey into pieces. Notice that the young are larger than in the previous slide, yet they are now only a few weeks older.

103. This is an adult Swainson's Hawk returning to its nest with prey. Do you see the prey? What is it? (Deer Mouse) What is the shape of the hawk's bill? (hooked) Why do you think it is this shape? (to tear prey apart) Can the shape of the bill tell you anything about the bird's food? Why?

104. This adult Swainson's Hawk is about to offer a freshly caught prey to its young. What kind of prey do you think it is? (Vole) Where would the hawk have caught the prey? (in grasses) Notice the long, strong talons on the toes. How do you think such talons would be useful for catching prey?

105. During late summer, many new flowers spring up on the prairies. Can you guess what the purple flowers are in this slide? (Teachers, pause for a moment and allow the pupils to give a few answers) Perhaps the next slide will give you a better clue.

106. If you guessed Wild Lupines, you were correct. Lupines belong to the pea family, and are considered a mid-summer flower...

107. ...as is the flower of the Butte Primrose, though in some places this flower appears as early as May or June. Plants can often signal seasonal changes in the same way that migratory birds or hibernating mammals do.

108. Occasionally clouds above the prairies are spectacular. If they become big and heavy, they can bring much needed rain or moisture for prairie life.

109. Lightning storms often cause prairie grass fires. Fire can be very beneficial for the prairies in the long run. Fires get rid of dry, hard parts of plants, making room for new green shoots which the animals can eat. The Indians knew this, and often set fires for this purpose. The health of the village depended upon the quality and quantity of food they ate. Fresh green shoots would ensure an abundance of healthy animals nearby.

110. Many grasses grow on the prairies, and by late summer most of them, except those around ponds and sloughs, are brown or yellow. Grasses are the food building blocks for prairie life. Without them, there would be much more erosion, and much less prairie wildlife. Late in summer, some animals go to pond and slough areas to get the still-green grasses.

111. Blue Grama, or Buffalo Grass, is a common and abundant prairie grass. It is a very nutritious forage grass for grass-eating animals, particularly in the autumn and early winter.

112. Darkling Beetles are found in all dry regions of the world. This one is hiding under a sagebrush plant. Darkling Beetles are often eaten by ground squirrels. The squirrels may become infected with a tapeworm as many of the beetles carry tapeworm parasites. If you touch one of these beetles, it will often put its rear end up in the air and emit an unpleasant odor.

113. This female Darkling Beetle is looking for a place to lay eggs. Can you see the ovipositor used to lay the eggs? (at back end) The tip of the ovipositor is pushed into the

ground near the plant roots upon which the larvae will feed when they hatch from the eggs.

114. Red Foxes are predators that help farmers and ranchers by feeding heavily on rodents, especially mice and ground squirrels. Occasionally they can be a nuisance around chickens and other farm animals. What do you suppose this young fox is looking at?

115. Examine the Red Fox carefully. What three senses do you suppose it uses to find prey? What two ways would it use to catch or hold prey? (feet and teeth)

116. Prairie Falcons are also predators that prey heavily upon ground squirrels. In fact, this one has a young ground squirrel in its bill. However, because of hunters and widespread use of pesticides, Prairie Falcons, like their cousins the Gyrfalcons (pronounced jeer-fal-ken), are now a threatened animal.

117. Can you guess what dug this hole? (pause for answers) It was not a Badger, but a Coyote. Underground there are several tunnels and at the back, another exit. Why do you suppose the Coyote would make more than one exit?

118. This is a Prairie Coyote. Coyotes are marvellous hunters, and in spite of being persecuted by man, they are still a very abundant animal. However, they have become gun-shy, and if you stop your car to look at one, it will most likely run away very quickly.

119. By early fall, in September, Tiger Salamanders move from the areas where they have been feeding all summer to places where they can get down into the ground below the frost line. Like frogs and snakes, many animals need to find special places to spend the winter.

120. What other animals do you think the Tiger Salamander is related to? (frog) What is the group of animals they belong to called? (amphibians) Do amphibians have hard, scaly skin, or soft, wet skin? (soft, wet) Other names for salamanders are eft and newt.

121. By the end of August, most Lark Buntings have flown south for the winter. They are rarely seen during September. Their main food is insects, which they catch on the ground and eat.

122. Thorny Buffalo Berries are a favorite food of birds, and are a definite signal that summer is almost over...

123. ...as are the flowers of the Bull Thistle (pause)...

124. ...and the seed heads of the Prickly Pear Cactus. Many Cactus seeds are eaten by birds and small mammals. Can you name a small mammal on the prairies that might eat cactus seeds? (mouse, vole, ground squirrel)

125. The seed heads of the Prickly Pear Cactus are sometimes used as a solarium by insects and spiders. Can you see the Long-legged Crab Spider on the seed head? These spiders are found only on Prickly Pear Cactus plants.

126. Can you see the spider in this slide? (have a pupil point it out) What kinds of camouflage does this spider use to protect itself? (shape and color)

127. By September, the Cushion Cactus seed heads are formed. At this stage, they are succulent and juicy. The early settlers and Indians used them for food.

128. During late summer and fall, alkali lakes are seen. Earlier in the year, they would have been full of water. What do you suppose causes the white color margins around the lake? (salts) Why do you suppose there is no vegetation in the white area? (too salty for plants to grow)

129. Each fall, grasshoppers lay their eggs in very select spots in the ground. This female grasshopper has her ovipositor stuck at least 2 cm into the ground, and she will deposit from 20 to more than 100 eggs in pods.

130. In the fall, rattlesnakes gather at the entrances to their wintering dens, called hibernaculums. How many rattlesnakes can you see in this picture? (there are 10-11) Snakes, like frogs and salamanders, must go deep in the ground below the frost line in order to survive the winter.

131. September is also the flowering month for many kinds of sage. Sage have a very strong smell or odor. The leaves of certain species of sage are used in cooking — for example, sage dressing.

132. Pasture Sage flowers are small and dull colored and are very seldom noticed by most people. Because this plant, like other sage, is unpalatable to livestock, it increases quickly on overgrazed ranchland.

133. Some flowers appear when all the grasses and forbs are brown. The brightly colored flowers of the Blazing Star is one of them. They...

134. ...and the brown seed heads of grass are sure signals of fall. By this time of year, most of the hibernating animals have gone underground, and the migratory birds have flown south. One of the big questions in biology is how do birds know when and where to migrate.

135. Bison, or American Buffalo, are no longer part of the prairie scene. Their calves are born in late spring and by late fall they are large enough to withstand the rigors of the coming winter. Bison calves do not have the typical hump found on the shoulders of the adult Bison. In fact, young Bison look very much like the calves of domestic cattle.

136. Dotting the prairies are large boulders worn smooth over the centuries by Bison. These are the well-known "Buffalo Rubbing Stones". Notice how a path is worn around the rock. This was made by the Bison as they went around the rock trying to rub various parts of their bodies. Because plants grow so slowly on the prairies, it may be many more years before the rock becomes surrounded by plants. In some places, the path is worn very deeply around the rock so that it becomes like a moat around a castle. Bison then wallow in the mud as a way to cool down, and to get rid of pesky insects.

137. Bison are large animals related to domestic cattle or cows. They once roamed the prairies in herds of thousands, and there may have been more than 20 million of them. They roamed freely on the prairies.

138. Today, however, they are found only in small, isolated, herds on private ranches and in special parks. Do you know what happened to them? Do you think that such a thing could ever happen to another animal? Why or why not?

139. Bison have been replaced over much of the prairies by domestic cattle. Often cattle over-graze the land causing many of the prairie plants to disappear, and in other areas, serious erosion to occur. As cattle are fenced in, over-grazing is always a potential problem. If cattle were not permitted to over-graze, then there would be little damage to the prairies, as they would feed in similar ways that the Bison used to.

140. The prairie habitat is a unique, fascinating area with many specialized plants and animals not found anywhere else in the world. Let us hope that the prairie habitat is preserved for future generations to enjoy. Consideration must be given now, however, for this marvellous but threatened part of our environment.

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